POPULAR Computing WEEKLY

5 August 1982 Vol 1 No 16

35p

Hunter-killer on Spectrum

BBC graph plot

Robot Nim

Astro Invaders

Space-saving on PC1211

Spectrum machine code tips

POPULAR Computing WEEKLY

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How to submit articles
Articles which are submitted for publication should not be more than 1000 words long.

All submissions should be typed and a double space should be left between each line.

Programs should, whenever possible, be computer printed.

At present we cannot guarantee to return every submitted article, so please keep a copy.

Accuracy
Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

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Editorial

The future of home computers lies in telesoftware, according to Nigel Searle, head of Sinclair's computer division. That is a bold, not to say prophetic, statement, considering the conspicuous lack of interest so far engendered by Prestel, Ceefax, Oracle et al.

Certainly, the development of a low-cost Prestel adaptor (*PCW* July 29) would make a telesoftware scheme financially feasible. But, what benefits would it offer to the user?

The most obvious benefit is access to an extremely large data base. This would be useful for both educational and business applications.

Another benefit is immediacy. Programs and other information transmitted via Prestel can be constantly updated.

A further benefit is the possibility of interaction with other users. It would be possible for clubs and individuals to contact each other over the air. The first CB micro may yet appear.

But, if telesoftware is to be a success, systems such as Prestel will have to be a great deal more user-friendly than they are at present.

Next Week

Survival in post-holocaust London means gang warfare. Can you lead your men to victory? You'll find out in Street Alley — a new game for Vic20.

Classified

HAVEN HARDWARE ZX PRODUCTS
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Haven Hardware, 4 Ashy Road, Ashy Workington, Cumbria

ZX81 (16K, FREE PROGRAM). Send cassette and sae to Nick Cowan, 3 Hurkur Crescent, Eyemouth, Berwickshire.

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P-E-P. The Program Enhancement Package for the ZX81 (16K). 7 fantastic new features for your basic programs. Only £5.95 from R. & R. SOFTWARE, 34 Bourton Road, Gloucester.

PECMAN & SKYSCRAPER CAPER. Tape 4, high resolution graphics for standard Vic20 £3 or sae for games available. M. Gardiner, 103 Holmes Chapel Road, Congleton, Cheshire.

ZX81 CONSOLE £17.50, case £27.50, securely mount computer, RAM, printer, recorder. No disconnections. Sae ZXBS, 14 Brookfield Gardens, Ryde. 0983 65897.

BBC DISASSEMBLER. All the features of more expensive disassemblers, runs in less than 4K, relocatable, £3.00 inclusive. Send cheque for quality cassette and full instructions to P. Mapstone, Stanhope Road, London N6 5AJ.

BBC SUPER STARTREK for Model B. All the features of regular Startrek plus extra asteroid storm and others. £4.50. T. Salo, 37B New Cavendish Street, London, W1M 8JR.

ZX81 VIDEO INVERTER PCB. Displays sharp white characters on solid black background screen. Kit £4, built £5, will fit inverter £7.50 (includes VAT + P&P. instructions). Send cheque/PO to D. Fritsch, 6 Stanton Road, Thelwall, Warrington, Cheshire, WA4 2HS.

ZX81, metal case, full keyboard, 16K, lots of leads and books £90. Phone Coventry 591935.

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ZX81 16K with real keyboard, number pad and new case, various programmes, £120 ono. 0895 51690.

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ZX81 16K plus £40 of software. Excellent condition £90. Tel: 01-504 0842.

VIC Intro to Basic £7. Bug-Byte, Asteroids, Vicmen, Alien, Blitz £4 each. 01-741 3361.

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TRS-80 16K level II cassette recorder, green screen VDU, covers, games, books, magazines (hardly used), £320 ono. Ring Mike: 061-764 7212.

SPECTRUM GAMESTAPE 1, includes Invaders, Othello, Combat, 3D O & Xs, Adventure, each with programming hints and tips, all for only £4.95. Kevin Porter, 2 Grove Road, Bristol.

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SPECTRUM GAMESTAPE 1: includes Invaders, Othello, Combat, 3D O & Xs, Adventure. Each with programming hints and tips. All for only £4.95. Kevin Porter, Raglands, 2 Grove Road, Bristol.

MZ-80K GAMES/UTILITY CASSETTE COLLECTION. Selling at £3 each. List: SAE. 38 South Parade, Bramhall, Stockport.

MZ-80K SOFTWARE. Send SAE for details. D. Adams, 91 Samuel Lewis Flats, Amhurst Park, London N16.

ZX PRINTER. Unused, fits ZX81 or Spectrum, £45. Stevenage 69612.

VIC20 (UNEXPANDED). Four fantastic games: UFO, Alien, Destroy, Pontoon, £3.95. D. Spencer, 230 Low Grange Avenue, Billingham, Cleveland.

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VIC20 COMPUTER, Arlon expansion unit plus lid, cassette recorder, cartridges, 8K Ram, 'superexpander,' 'Super Lander', 'Road Race', joystick, intro to Basic, 5 games cassettes, Book: 'Vic Revealed'. Will sell together for £350 or separately. Ring Southend (0702) 66742 for prices.

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SHARP MZ80K 48 K, only five months old, £395 ono. Price includes £100-worth software (by Knight's Ltd, Aberdeen) on cassette. Kane, 66 Haw Road, Bushmills, Co Antrim BT57 8YJ.

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ZX USERS

Join the National ZX Users' Club, and make the most of your ZX81, Spectrum or ZX80. Each month we publish the magazine INTERFACE, which contains a host of programs for each machine, as well as members-only offers, hints, tips, contact addresses and more. We'll also help you with your hardware or programming problems. Join the country's largest users' club. £1 gets you a sample copy of INTERFACE and full club details.
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(SAE for ZX catalogue)

ZX81 16K JACKPOT. Fruit machine program, 15 symbols in view, full screen graphics, holds, nudge feature, nudges up/down, collect/gamble on nudges and wins, 52 winning combinations. Cassette £4.95. P. G. Curtis, 4 Stanwell Road, Ashford, Middlesex TW15 3ER.

VIC20 CASSETTE UNIT. Several cartridges, books including VIC Revealed, £50 of programs worth £450, will accept £350 ono. Tel: 0656 50696.

VOLUME ONE (1981) "Your Computer" issues wanted. Ian Kirk, Blackpool 27612.

TANGERINE MICRON, 10K basic, Xbug, toolkit, 8K RAM. Many games plus full documentation, £260. Tel: Stafford 665360 after 8.00 pm.

VIC20 EXPANSION 16K (Afron Micro) brand new. Plus Star Quest adventure game. Unwanted gift, £65 ono. Tel: 848 4000.

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FULCRUM PRODUCTS, DEPT W, HILLSIDE, STEEP LANE, FINDON W. SUSSEX BN14 0UF

Enter Sony with a video-linked micro

SONY has made its long-awaited entry into the micro market with the new SMC-70.

The machine, with an optional video disc interface, is intended both for conventional computing and video applications.

The SMC-70, an 8-bit micro based around the Z80A processor, features 64K Ram, 16 colours and hi-resolution graphics. The machine uses a version of Basic designed by Sony and the CP/M® operating system.

It is the first micro to be designed specifically for use with a video disc player. Selected information can be lifted off the Sony video disc system and displayed — its format and content being determined by the user. The main application of this will be an educational one, being well suited for presenting all types of learning material.

To ensure that this video facility is useful the SMC-70 has advanced graphics capabilities. The 16-colour mode will display either four pages of 160 × 100 pixels or one page of 320 × 200 pixels. The hi-resolution black-and-white mode will display a page of 640 × 400 pixels.

Sony's SMC-70 microcomputer with dual disc-drive unit.

Other facilities include cassette, IEEE and RS232 interfaces, floppy disc control unit (for Sony's 3in micro-floppies), light-pen input and battery back-up unit.

Among the expansion options are a 256K cache disc unit and a 256K-1M 16-bit CPU adaptor unit.

The SMC-70 will go on sale in the US in September. The basic model will cost around £750 but a complete system will cost nearer £2500.

At present Sony has not announced any plans to sell the machine in the UK.

Primary schools get a £9m micro boost

KENNETH Baker, Minister for Information Technology, has announced details of the government's £9m "Micros in Primaries" scheme.

Under the plan, the government will contribute half the cost of putting a microcomputer in Britain's 27,000 primary schools. The other half of the cost will be met by local education authorities, parent/teacher associations and local interest groups.

Only three micros are eligible for the scheme — Sinclair's 48K Spectrum, Acorn's BBC model B with disc interface and Research Machines Link 480Z.

Each micro is available with a teacher training package. Two teachers from each participating school will be required to attend a short course on the use of micros in primary education.

The scheme, which will run from October 1 this year to the end of 1984, is an extension of the existing secondary schools grants system.

Some 5200 secondary schools have benefited so far, to the tune of £3m.

"Our objective is to enable teachers to get started in giving all young pupils — the five- to ten-year-olds — experience with technology," concluded Kenneth Baker.

And they're off . . . looking for their Spectrums?

Clive shows his pace in Cambridge race

THE first Sinclair Cambridge half-marathon, held on July 18, has been won by Ian Thompson.

The former British, European and Commonwealth champion completed the course in 1hr 5mins 17secs.

Of more than 1300 hopeful competitors exactly 1000 finished the 13.1-mile route. The race, sponsored by Sinclair Research, was the first of its kind to be included in the Cambridge Festival Calendar.

Clive Sinclair and Nigel Searle were among the large contingent of Sinclair staff taking part.

Clive finished 699th in a time of 1hr 51min 41sec.

The three-lap race through the streets of Cambridge was organised by the city council in conjunction with the Festival. Cambridge City council's Brian Allinson said: "We were particularly delighted with the very festive crowd which gathered around the course."

Unemployed to learn computing skills

AN Information Technology Centre has opened in Camden, London.

At the centre, the first of 10 soon to be opened, 50 unemployed school-leavers each year will be taught a range of computing skills.

Hitachi at IBM secrets hearing

HITACHI has announced its intention to "voluntarily appear" before a US court to hear charges relating to the IBM secrets case.

It is alleged that nine Hitachi and four Mitsubishi employees were involved in illegal purchases of stolen IBM computer secrets.

Both companies deny that they acted illegally.

Hitachi itself and its nine employees in Japan have received summonses to attend the hearings. These orders issued by the US Embassy in Tokyo were delivered by Japan's Foreign Ministry.

No Hitachi executive is expected to attend the hearing at the North California district court in San Jose. The company will be represented by one of its US lawyers.

A spokesman for Hitachi has said that it will "in no way interfere" with the decisions of its nine employees whether or not to attend the San Jose hearings.

Spectrum game

QUICKSILVA has now produced its first Spectrum software game.

Space Intruders costs £5.95 and is available from Quicksilva at their new address — 92 Northam Road, Southampton.

Further QS Spectrum cassettes are to follow shortly.

An exciting new Commodore peripheral

Own or use a Pet or a Vic?

Fed up with being ignored by all the traditional monthly magazines?

Fed up with listings, which are too simple or simply do not work?

You need *Commodore Computing*, the new monthly magazine. *Commodore Computing* is published by Nick Hampshire, author of *The Pet Revealed, Pet Graphics, A Library Subroutines* and *The Vic Revealed*.

Each issue is packed with advanced advice on how to make the most of your computer, whether you use a Pet of a Vic.

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Letters

write to Letters, Popular Computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2

Hey! Where's ma Spectrum?

It is nine weeks today since I sent off my order for a Sinclair ZX Spectrum. It is seven weeks since my cheque was cashed.

If, as appears in a recent edition of your magazine, 17,000 Spectrums have been ordered at an average price of say £145, then Clive Sinclair is holding on to £2,465m of other people's money. The interest accruing at Building Society Rates, say 13 per cent, for a seven-week period is over £43,000.

With £10m profit and an additional £43,000 of our money, the least I would have expected would be a letter of explanation.

Michael Diamond
20 Thorncliffe Gardens
Glasgow G41 2DE

Another Beeb fan bytes the dust

I am glad that *PCW* has got nearer the truth about BBC computer deliveries after the totally fallacious story of June 10 that "Acorn had cleared its backlog of orders". My order of November 28, 1981, is still outstanding, even though it is a re-order of a requisition made the previous June. Frankly, I don't call a year's delay "clearing the backlog of orders".

I won't bore you with the tale of frustrating phone calls trying to get information, nor of the sadly lacking "customer relations" on the part of a number of Acorn representatives. John Coll did offer to help back in February, when there was a need to use the BBC computer to consider its use in a £16,000 computer package for the local comprehensive school. Sadly, the sales department were unaware of the offer when I phoned them in a fit of frustration in May.

In response to their request to send a copy of John Coll's letter, so that they could know what was going on, they sent me a cyclostyled form to confirm delivery in "June/July".

The local computer committee met last month to consider its deliberations. By this time the school had had a visit from the Acorn caravan to demonstrate the Econet system. It didn't work, even though it stayed in the school for over a week. We were told that there was a fault in the network using BBC computers which had yet to be solved.

In response to a reminder that a rather important order was involved (from the school's point of view, at least), Acorn's representative replied that £16,000 was "peanuts" to them.

I was appalled with this attitude. How insignificant an order for a mere one-off computer must be. Other customers beware! Frankly, even if the problem is only a duff cassette recorder, any reputable firm should surely show concern.

Our committee showed its concern by confirming an order for the latest Nascom System. It actually works and will be installed in July. Despite my firm advocacy for the Acorn BBC computer throughout the committee's deliberations, I could not maintain my support when the company's confused state pulled the rug out from under their own feet.

David Tall
21 Laburnum Avenue
Kenilworth CV8 2DR

While another gets a bit miffed

One, if not the only frustrating element in purchasing your magazine is that you are too biased to ZX81 and Vic (see *PCW* July 15).

Owning a BBC micro, I feel really "had" by the now 35p price tag. So how about fair shares for all, or are you paid by the ZX81 reference?

D Nevard
1 Sands Lane
Carleton-le-Moorland
Lincoln LN59 HJ

If you look at *PCW* July 22, you will see that we are not biased against the BBC micro. That issue contained a cover story (Voyager on BBC) and three Open Forum programs written specifically for the BBC micro.

However, there are approximately 300,000 ZX81s in the UK as against some 20,000 BBC micros. While we try to provide a balanced coverage of different micros, we also try to reflect the interests of our readers.

Pope is unfair competition

Having read the article in *PCW* June 24, regarding the first ZX Fair to take place outside London, I feel (like many ZX users in the north) that I must comment on the reasons for the attendance being "down to few more than 2000 for the two days".

First of all, having spoken to users who did not even know the show had taken place, I feel that the publicity was very poor. The only advertisement I have seen for the show was a small advertisement for one week in your own magazine. There was no mention of it in *Sinclair User* which I am sure many ZX users read.

Secondly, it was unfortunately held on the worst weekend of the year, when, owing to the once-in-a-lifetime visit of Pope John Paul II there was no parking in a 50-mile radius of Manchester (a slight exaggeration, but I am sure it did not help).

As one of the 2000 or so who attended the fair, may I please say do not let it put you off holding another one in the future. We thought it was super, only next time let more people know about it.

S Metcalfe
21 Sherwood Avenue
Radcliffe
Manchester M26 0LE

Upon the merits of competition

Re Mr Robert Lober's slight criticism of the ZX Spectrum in *PCW* July 1, may I reply on behalf of many of us waiting for our Spectrums to arrive.

Even the novices to the computing field, myself included, probably accept that the BBC micro is indeed a fine computer with many good features, and that many people would like to own one. But, he has answered his own comparison query by stating that his satisfaction has been met by the expense of £600.

Bearing in mind the basic 16K Spectrum is only £125, one does not seem to get much extra value for the additional £475. Also, how many newcomers can afford this kind of money, however advanced the equipment may be?

Having said that, is not the BBC micro model B approximately £400, if you can get one that is.

While writing, could I perhaps make a suggestion to the editorial team. Could you make your competitions available sometimes to those of us not yet able to invent programs? There are many of us who buy your magazine who would like to enter these competitions.

Robin Window
18 Easthams Road
Crewkerne
Somerset

Good news from the Beeb, at last

Just a line to send my apologies to your news editor concerning your editorial on Acorn's backlog. I accused him of not getting his facts right when, in point of fact, it was me who had the facts wrong.

Even though the girls at Kettering's telephone department told me that my expected delivery date was September, and that they had not cleared their backlog, yesterday my BBC micro was delivered. Once again, I therefore apologise for the comments I made.

May I also compliment you on a very interesting and topical magazine which I now subscribe to every week.

F Wright
7 Eastbourn Street
Lincoln
Lincolnshire

Please keep your letters as brief as possible.

COVER STORY

Hunter-Killer

A new game for Spectrum
by David Lawrence

As the moon slipped behind a cloud, a lone figure fell silently from the plane. Suddenly a parachute blossomed and the plane banked away sharply.

The soft velvety landscape of dense Amazon jungle drew nearer with upper branches and creepers apparent more than 80 feet above the ground.

This lush cushion rushed up as the intruder crashed into the trees. Painfully suspended on the lines from the 'chute, the suffocating heat engulfed him as branches closed overhead.

A quarter of a mile away, the small supplies package broke through the green surface and fell to the ground. Immediately it began sending its radio signal so that the killer could be reunited with his weapons.

In Catrillia, the arrival had not gone unnoticed.

Zironas turned to Epa "He is with us" he said. "We have no choice now. You must go, and go quickly." Epa nodded, stern faced, and Zironas continued: "He comes with evil intent. Though it offends our code to send you, we can do nothing else.

"If he comes to kill, he will be killed. In these times any measures become acceptable. One orders actions, without second thought, that before would have seemed too appalling to contemplate.

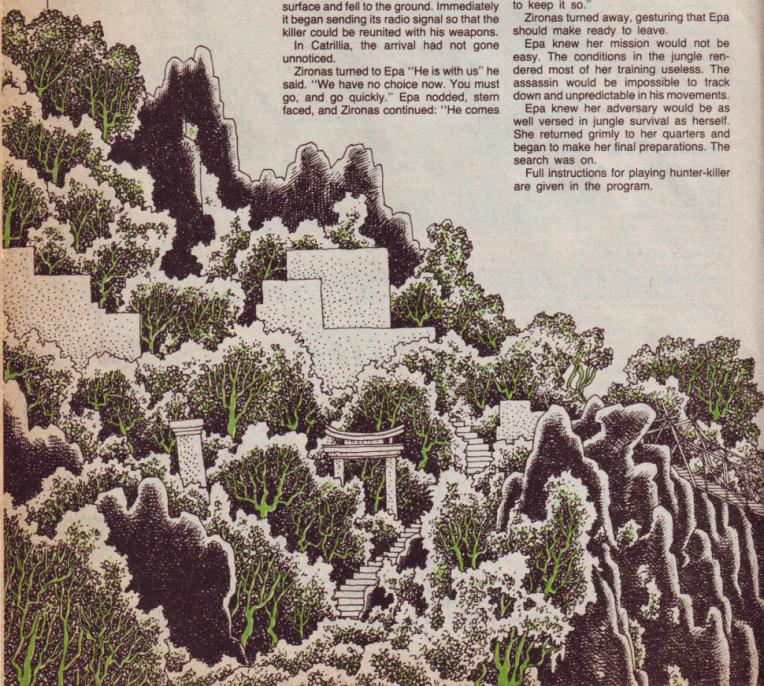
"But it must be. Our country has lived in peace for 40 years now — and we will kill to keep it so."

Zironas turned away, gesturing that Epa should make ready to leave.

Epa knew her mission would not be easy. The conditions in the jungle rendered most of her training useless. The assassin would be impossible to track down and unpredictable in his movements.

Epa knew her adversary would be as well versed in jungle survival as herself. She returned grimly to her quarters and began to make her final preparations. The search was on.

Full instructions for playing hunter-killer are given in the program.



```
1000 BORDER 0: INK 7: PAPER 7: P
RINT AT 10,0;"Do you want instruct
ions? (Y/N)"
1020 CLS
1030 GO SUB 3010
1040 IF 0$="Y" THEN GO SUB 2620
1050 GO SUB 2670
1060 REM ************************
1070 REM VARIABLES
1080 REM ************************
1090 LET A=0
1100 DIM M(100,4)
1110 LET L=20
1120 LET P=0
1130 LET T=0
1140 DIM M(32)
1150 LET R1=6-INT (RND*13)
1160 LET R2=6-INT (RND*13)
1170 LET P1=INT (RND*18+1)
1180 LET P2=INT (RND*30+1)
1190 REM ************************
1200 REM ************************
1210 REM ************************
1220 CLS
1230 LET A$="123456789012345678
9012345678901234"
1240 FOR I=1 TO 18: PRINT A$(I):
NEXT I
1280 GO SUB 1680
1300 REM ************************
1310 REM INPUT AND DIRECTIONS
1320 REM ************************
1325 INK 0
1330 LET T=T+1
1340 IF T>100 THEN GO SUB 2620
1350 LET B=0
1360 PRINT AT 19,23;"MOVE ";T
1370 PRINT AT 21,17;"(0 FOR REVI
EW)"
1380 PRINT AT 19,1;"DOWN:"; INP
UT M1: PRINT M1
1410 IF M1<19 AND M1>-1 THEN GO
TO 1450
1420 PRINT ">OUT OF RANGE": PRIN
T AT 19,0;0$: GO TO 1360
1450 PRINT AT 20,0;0$
1460 IF M1=0 THEN GO TO 1490
1470 GO SUB 2000
1480 GO TO 1330
1490 PRINT AT 21,0;0$
1500 PRINT AT 20,1;"ACROSS:"; I
NPUT M2: PRINT M2
1530 IF M2<31 AND M2>0 THEN GO T
O 1570
1540 PRINT ">OUT OF RANGE": PRIN
T AT 20,0;0$: GO TO 1500
1570 PRINT AT 21,0;0$
1580 LET M(T,1)=M1: LET M(T,2)=M
2
1600 IF M1<>P1 OR M2<>P2 THEN GO
TO 1610
1605 GO TO 1940
1610 LET M3=(M1-P1)-(M1-P1)*1
1620 LET M4=(M2-P2)-(M2-P2)*2
1630 LET D=M3+3*M4
1640 IF D<4 THEN LET D=D-1
1645 LET M(T,3)=D
1650 IF D=0 THEN GO SUB 1850: G
O TO 1330
1660 REM ************************
1690 REM PRINT BOARD AND MOVE
1700 REM ************************
1705 PAPER 5: INK 1
1710 FOR I=1 TO 4
1720 PRINT AT 2+I,2;"[redacted]"
1730 NEXT I
1740 NEXT
1745 INK 1: PAPER 7
1750 PRINT AT 19,0;0$,0$
1760 IF T=0 THEN RETURN
1770 PRINT AT M1,M2;CHR$ (143+D)
1780 IF A<1 THEN RETURN
1800 IF T<32 THEN PRINT
AT 21,0;"[redacted]"
1810 RETURN
1830 REM ************************
1840 REM MOVE INCREMENT
1850 REM ************************
1860 LET P1=P1+M1: LET P2=P2+M2
1870 IF T/6(INT (T/6) THEN GO T
O 1910
1880 LET P1=INT (P1+RND*6+1): LE
T P2=INT (P2+RND*61)
1900 PRINT AT 21,0;"[redacted]"
1910 LET P1=P1+18*(P1(1)-18*(P1)
1920 LET P2=P2+30*(P2(1)-30*(P2)
1930 RETURN
1940 REM ************************
1950 REM ************************
1960 REM ************************
1970 LET A=A+1
1980 INPUT "Another game? (Y/N)"
0$
1985 IF 0$="Y" THEN GO TO 1060
1990 STOP
2000 REM ************************
2010 REM REVIEW OF GAME
2020 REM ************************
2030 CLS
2040 PRINT AT 19,0;0$,0$
2045 IF C1>0 THEN GO TO 2150
2050 PRINT AT 8,13;"[redacted]"
2060 PRINT AT 8,4;"REVIEW ALLOWA
NCE - [redacted] MOVES"
2070 PRINT AT 10,8;"YOU HAVE USE
D "; C1
2080 PRINT AT 19,1;"LAST MOVE WA
S NO:"
2090 PRINT AT 21,1;"INPUT FIRST
NO. FOR REVIEW:"; INPUT T1: PRI
NT T1
2120 FOR J=T1 TO T-1
2130 LET C1=C1-1
2140 IF C1<0 THEN GO TO 2170
2150 PRINT AT 19,4;"REVIEW [redacted]
2160 GO TO 2200
2170 LET M1=M(J,1): LET M2=M(J,2
): LET M3=M(J,3)
2210 GO SUB 1680
2220 PRINT AT 19,6;"REVIEW OF MO
VE ";J
2230 PRINT AT 21,20;"(0 TO QUIT)
"
2240 INPUT 0$: PRINT AT 19,0;0$;
2250 IF 0$="0" THEN GO TO 2280
2260 NEXT J
2270 LET T=T-1
2280 LET M1=M(T,1): LET M2=M(T,2
): LET M3=M(T,3)
2290 GO SUB 1680
2300 RETURN
2350 REM ************************
2360 REM INSTRUCTIONS
2370 REM ************************
2380 REM ************************
2390 CLS
2400 INK 0: PRINT "This is a hun
ting game.""The hunting ground
is an irregular board.""The
quarry ""Each turn the quarr
y makes a ""random move.This mo
ve does not change during a ga
me.""The move
2420 PRINT "The move can be up
to six spaces down,up and s
ideways left""or right.
2430 PRINT "Press any key for m
ore""instructions."
2440 PAUSE 0
2450 CLS
2460 PRINT ""Each turn consist
s of:-
2470 PRINT "(1) An invitation to
 input your""estimate of the po
sition of the quarry.
2480 PRINT "(2) An arrow will ap
pear in your""open filed square
indicating the""direction of th
e quarry.
2500 PRINT "(3) The quarry will
move.
2510 PRINT ""Press any key to co
ntinue"
2520 PAUSE 0
2530 CLS
2540 PRINT ""At the start of ea
ch turn you""have the opportuni
ty to review""the hunt so far.
2550 PRINT "This is done by ent
ering 0 when""the DOWN co-ordin
ate is requested.
2560 PRINT "You can start the r
eview at any""previous move but
 you are""limited to reviewing
20 moves""in any one hunt."
2570 PRINT ""These 20 reviews ma
y be taken at advance or in b
itches."
2580 PRINT "Any key to start."
2590 PAUSE 0
2600 RETURN
2610 REM ************************
2620 REM HARD MODE
2630 REM ************************
2640 CLS
2650 PRINT AT 10,0;"SORRY-CAN'T
TAKE MORE MOVES."
2665 STOP
2670 REM ************************
2680 REM SET DIFFICULTY
2690 REM ************************
2700 CLS
2710 PRINT ""There is a diffic
ulty factor""built into the gam
e.
2720 PRINT "This consists of an
 entirely random move every 30
 often.
2730 PRINT "The difficulty fact
or ranges""from a to 10.
2740 PRINT "0 gives a random m
oves at all.""
2750 INPUT "Please input
your desired""difficulty factor
: E
2760 LET E=(11-E)*22+100*(E=0)
2810 GOTO 3000
3000 REM ************************
3010 REM USR CHARS
3020 REM ************************
3025 RESTORE
3035 FOR I=1 TO 9
3040 FOR J=0 TO 7
3040 READ B
3050 POKE USR CHR$ (143+I)+J,B
3060 NEXT J
3070 NEXT I
3080 RETURN
3090 DATA BIN 00000000,BIN 01111
000,BIN 01100000,BIN 01010000,BI
N 01001000,BIN 00000100,BIN 0000
0010,BIN 00000001
3100 DATA BIN 00000100,BIN 00011
100,BIN 00101010,BIN 01001001,BI
N 00000100,BIN 00000100,BIN 0000
1000,BIN 00000000
3110 DATA BIN 00000000,BIN 00011
110,BIN 00001010,BIN 00001010,BI
N 00001010,BIN 00000010,BIN 0100
0000,BIN 10000000
3120 DATA BIN 00000000,BIN 00100
000,BIN 00010000,BIN 00001000,BI
N 00000100,BIN 00000010,BIN 0001
0000,BIN 00000000
3130 DATA BIN 00000000,BIN 00000
000,BIN 00000000,BIN 00000000,BI
N 00000010,BIN 00000100,BIN 0000
1000,BIN 00000000
3140 DATA BIN 00000000,BIN 00000
000,BIN 00000000,BIN 01001000,BI
N 01010000,BIN 01100000,BIN 0111
1000,BIN 00000000
3150 DATA BIN 00000000,BIN 00001
000,BIN 00001000,BIN 00001000,BI
N 00001001,BIN 00101010,BIN 0001
1100,BIN 00000000
3160 DATA BIN 00000000,BIN 01000
000,BIN 00100000,BIN 00010010,BI
N 00001010,BIN 00000110,BIN 0000
1111,BIN 00000000
```

POPULAR Computing WEEKLY

Discount Club

SPECIAL OFFER

PCW has negotiated a special discount offer on four of the top games cartridges for the Commodore Vic20. The cartridges are manufactured by Audiogenic.

SAVE £7 on Renaissance

PCW price £17.99 (List price £24.99).
Renaissance is the ultimate Othello package for the Vic20. Use joystick or keyboard control to play against the Vic. There are eight levels of play. During the game you can change sides and playing level, take back moves, set up and play special games. You can even save and recall whole games to and from cassette.

SAVE £7 on Meteor Run

PCW price £17.99 (List price £24.99).
In **Meteor Run** you must pilot your spaceship through the Meteor belt, blasting your way through the rocks and Alien saucers. Similar to an Asteroids game it includes an early warning radar display.

SAVE £7 on Spiders of Mars

PCW price £17.99 (List price £24.99).
In **Spiders of Mars** you are a trapped fly. You must shoot your way across Mars avoiding the dreaded Spiders and the other flying creatures. Accompanied by classical music.

SAVE £3 on Cloudburst

PCW price £16.99 (List price £19.99).
In **Cloudburst** you must save the Earth from the downpour of Acid raindrops and the invasion of the mutant Cloud Hoppers. Speed and skill are essential. With original music and ten levels of play.

To have these top cartridges sent to your home all you have to do is fill in the form below and send it off to *Popular Computing Weekly*.

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	Renaissance	£17.99
	Meteor Run	£17.99
	Spiders of Mars	£17.99
	Cloudburst	£16.99
	Total £	

I enclose a cheque, made payable to *Popular Computing Weekly* **Discount Club,** for £.....

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Address.....

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All prices are inclusive of VAT and postage.

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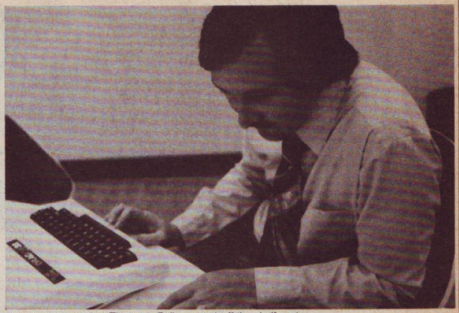
Street Life

Breathing fire into the Mettoy Dragon

***David Kelly** visits the Patscentre and talks to the designer of the Dragon 32.*



Dragon designer Ian Thomson Bell . . . used off-the-shelf parts.

The Patscentre is a unique development facility. For each client they draw on expertise in many disciplines in order to produce an innovative and competitive product.

From the car park the building is invisible. Nearing the top of the steps the long workshop suddenly emerges. It is low-lying and futuristic.

Inside, primary-coloured tubular steel railings and plants vie for attention. Everyone carries an identity card and a bleeper.

It is in this environment that Ian Thomson Bell conceived and developed Mettoy's micro, the Dragon 32.

Mettoy's brief was precise. Ian began work on the project in October 1981. The first prototype was demonstrated to the Mettoy board by Christmas. The Dragon should be on sale in the shops from August 2.

Ian is not unused to working to such tight schedules. That is what the Patscentre is about. At any given time he can be working on up to three such projects, each at different stages of development.

He explains how the design of the Dragon progressed: "We chose Microsoft Basic because the timescale dictated an off-the-shelf interpreter. The 6809 chip was selected because it is the best 8-bit processor.

"As far as the CPU is concerned, the design was relatively straightforward. With the 8-bit, the SAM chip and the 6847 you have virtually a home computer in three chips.

"The difficult parts of the design were the Microsoft driver and the video conversion."

The Microsoft driver was developed by Duncan Smeed at the University of Strathclyde.

"When Duncan brought it down," said Ian, "we tried to find out why it was so slow. After all, the 6809 is very fast.

"We looked at the Tandy TRS-80 which also uses the chip and found that it too was comparatively slow. On the first version we designed a For/Next loop from 1 to 1000 which took two seconds to run.

"At first we thought it was because the Microsoft Basic was in some way cross-assembled from the Z80 Basic. Then we thought it could be a problem with the internal clock. Neither proved to be the case.

"We looked at the amount of time spent scanning the keyboard. Of the 2ms spent in each run of the loop, 0.7ms was spent in the keyboard checking that keys such as *Break* had not been pressed.

"We tackled it as a logic problem. Instead of scanning *each* key in turn, we designed it to check if *any* key had been depressed. This speeded up the software considerably — that is why the Dragon is so quick."

The problem with the video side of the circuit was that the SAM chip gives an output compatible with the American tv standard — NTSC — rather than the British PAL colour system.

"We were quite tempted to go to ULAs for the conversion chip, but the tight time-scale really precluded that. Instead, we took an existing Motorola circuit and redesigned it."

There is a fundamental resolution limit with a conventional tv. At the start of the signal of every tv line scan there is a reference burst. This corrects the incoming line information so that it has the same quality of colour and intensity as the preceding lines.

If the pixel width is less than one cycle of this reference-seeking circuit, then the tv will not recognise colour. Thus, the resolution limit for colour graphics is set by the tv rather than the micro.

Ian explains: "The Dragon has been designed to operate on this screen limit of 128 x 192 for colour and 256 x 192 for black-and-white."

When at college Ian played in a band and designed a mixing desk. When he left, he worked first for BAC and then Neve — a studio equipment manufacturer.

After building mixing consoles for the Who and the Kinks, he returned, briefly, to BAC before joining Patscentre International.

"It is good to see a thing through from the initial design to the finished product," he says. "The advantage of the Patscentre is that it has such a tremendous range of skills, all under one roof.

"One day we will tie up biotechnology with electronics on a molecular level to make a sort of living computer."

The centre is also working on what are called Thick Film Hybrid techniques — a way of producing a complete computer in one chip. "The whole shooting match would then fit in a match-box," says Ian.

Meanwhile, the Patscentre is continuing to extend the Dragon project.

Development is in hand for a mini-floppy disc system for under £250. Next year will also see the launch of an advanced Dragon — with 64K, enhanced graphics and a built-in disc operating system.

What's happening

East London micro users who are interested in getting together to exchange software and perhaps form a club should contact Noorel Haque, 35 Tunis House, Hartford Street, London E1.

Aylesbury ZX Computer Club now hold specific interest meetings (machine-code, hardware etc) each week at Quarrendon Youth Club, Aylesbury. General monthly meetings will recommence in October at Aylesbury College. Contact Ken Knight, 22 Mount Street, Aylesbury, Bucks.

Reviews
software

Robot Nim

A and F Software, 10 Wiltshire Avenue, Longsight, Manchester 12.
Atom, 5K test 0.5K graphics, cassette.
Price: £2.95.

This program is based on the old game of Nim where the aim is for two players, in turn, to remove matchsticks from a pile.

The winner is the one who picks up the last matchstick.

Nim has always been a standard exercise for student micro programmers. All states of the game can be represented as nodes in a binary tree, such that the winning strategy is always clear. This means a computerised form is just about unbeatable — unless you, too, know the technique.

"I won . . . I usually do" crows the insufferable Atom at the end of each game in this version. Indeed, you little brat, I'll get you next time. This is one of the few programs that have caused me to laugh out loud. I love it.

The matchsticks in this implementation are cuddly little robots rather reminiscent of the Homepride flour men. You have the option of setting them up in rows totalling between nine and 35 targets. You have the option, too, of starting. In your move you specify the number of robots to be 'removed' and which row they are in. The robot executioner gallops off to do the dirty work for you and then for the computer.

Meanwhile, the non-exterminated robots visibly quail in fright. (A clever technique to stop you working out your strategy.) The robot next to be pulverised gains a look of terror and emits a terrified squeak. The sound in this program is as brilliant as the vision.

"I won . . . I usually do" indeed. I'll wipe that grin off your smug little screen. Next time I'll set up the robot rows and really work out a strategy. Just don't let me see those frightened faces, that's all . . .

Summary
A totally brilliant version of Nim. Get it, and experience a computer laughing at your incompetence. **KJ**

Volcanic Dungeon

Carnell Software, 4 Staunton Road, Slough, Berkshire.
ZX81, 16K.
Price £4.50 plus 50p p&p.

Volcanic Dungeon is one of the better adventure games currently on the market. Set in a Tolkeinesque world of elves and dragons, you have the task of rescuing Princess Edora from a crystal coffin hidden deep within the Volcanic Dungeon.

Volcanic Dungeon & HANGMAN C2

When the game begins, you will find yourself in the top left-hand cavern. You are armed with a sword and a magic ring given to you by the elfin lord Fendhal. The ring has two important properties. It enables you to absorb strength from opponents that you succeed in killing, and it warns you when the evil witch Magra is powerful or weak.

Various treasures, in the form of enchanted weapons and defences, are scattered about the dungeon. But only experience will tell you which weapons/defences will be effective against which enemies.

The Volcanic Dungeon is ringed with fiery caverns. Death is instantaneous if you enter any of them.

Other hazards include unmarked pits. Falling into a pit is not necessarily fatal, but you will need at least 100 units of strength to climb out of it.

You can replenish your water supply from a number of water holes, provided they are unguarded. If a water hole is guarded, you will have to kill the guard before you can drink the water.

Parts of the Dungeon are only accessible by crossing bridges. If a bridge collapses, you will have to use a flying carpet or flying potion to reach the other side.

Summary
An excellent game at a reasonable price. The instructions are among the best I have ever seen. There is also a Hangman game on the other side of the tape. **BG**

Astro Invaders

John Price, 29 Brook Avenue, Levenshulme, Manchester.
ZX81, 16K, cassette.
Price: £3.65.

It could have been any one of a thousand streets in a hundred cities.

I walked through the clammy fog, keeping to the shadows. A light glinted weakly from the corner as I approached. I could make out a few words: "Astro-Invaders . . . superior m/c programming . . . explosive on-screen kill effect".

My attention was held. "A new dimension in ZX81 value — only £3.75" screamed at me in neon. That clinched it. This I gotta see, I muttered, as I entered the low doorway.

The place was almost deserted. Just a pianist doodling on a baby grand, two or three cool-looking guys and a couple of sparkling starlets. But at the bar . . . WOW! I sidled up to the cassette, letting my cigarette dangle from the corner of my mouth. "This could be really something" I figured.

I loaded the program. Would it give me what it promised? I could see it had "high-scoring saucers" and "destructible defence shields".

For a while I got an "accelerating attack rate" but, in the end, it didn't deliver.

I tried to cover a yawn, but the cassette caught my eye. It hit me with a few other little games — but they were just window-dressing.

The spool ran some more. It's final ploy was *Swat*, which drew a momentary flicker of interest from the punters at the bar. It almost made it worth my while to stick around. After all, the price was cut back so far a bald man might think he needed a trim.

But I had places to go — things to do. I couldn't hang around all night.

It was getting light. As I passed the piano I threw a couple of dimes on to the polished keys. "Play it again" I drawled.

Summary
This spool promised a lot, but didn't deliver. Maybe, kiddo, *you'd* find the price right. I'll meet it again some day, when it's learnt some more tricks. Until then, I'll stick with the classier reels. **TB**

Copyright

Hard lesson in store for 'soft' pirates

***Roger Pearson** explains how the law on software copyright could affect you.*

A nasty shock could be in store for some home computer software producers. They could, in the near future, find themselves in the High Court accused of copyright piracy.

The past year has seen a flurry of activity at the High Court, in London, as various manufacturers of coin-operated video amusement machines have battled to stop their games being copied.

Various big names in the amusement industry such as Sega, Atari and Williams Electronics have taken legal action against alleged pirates, claiming that their games are protected by copyright. This action has provided an effective remedy against the unauthorised copying that has been going on.

Now it seems the big guns of the amusement industry could well be turned towards the home computer market, where they believe unauthorised copies of their games are being marketed to home computer enthusiasts.

A lawyer who has represented several of the major amusement industry companies, Mr Gordon Day, said: "Companies in the amusement industry are now beginning to turn their attention to the home computer versions of some successful amusement arcade games.

"I think the outcome could well be that some of the people who produce software for home computers could face legal action in the not too distant future."

A number of software writers and companies have been producing their own versions of popular arcade games such as Puckman, unaware that they may be in breach of copyright. But the copyright war in the amusement industry has gone a long way in clarifying certain aspects of the argument over copyright protection for computer programs.

However, this has gone largely unnoticed in the computer world. Micro enthusiasts have failed to recognise the similarity of the basic issues involved when it comes to protecting arcade games from unauthorised copying.

For this reason a look at the amusement industry copyright battle is worthwhile. So far, all the hearings in the High Court have been interim claims for injunctions to stop alleged piracy, pending the full trial of copyright actions at a later stage.

Sega's Frogger . . . at the centre of an important legal battle to establish copyright.

Until July 2, judges had been careful not to give any firm judicial indications that computer programs are actually protected by copyright. However, on July 2, in interim injunction proceedings between Sega Enterprises and John Richards (a video game conversion expert) and his company Trolfame, this was changed.

Granting Sega injunctions stopping Mr Richards and his company from dealing in alleged unauthorised copies of Sega's game 'Frogger', Mr Justice Goulding gave the clearest indication from any judge so far that he believes copyright protection is available for computer programs.

In his judgement he said: "On the evidence before me in this case I am clearly of the opinion that copyright under the provisions relating to literary works under the Copyright Act of 1956 subsists in the assembly code program of the game of 'Frogger'.

"The machine code program derived from it, by operation of a programmed part of the system of the computer called the assembler, is to be regarded I think as a reproduction or adaptation of the assembly code program.

"Accordingly I find that for the purpose of deciding this motion that copyright does subsist in the program."

Sega also claimed that there is artistic copyright protection for the images reproduced on the video screen of the game, both during play and during the non playing attract mode sequence. In addition, Sega said that there is further protection for the sequence of visual images under the copyright laws which relate to cinematographic film.

The judge made no ruling on the latter two points, however. He said it was sufficient for the purpose of the injunctions to make a finding on the literary copyright issue.

As a result of this case, some home computer software producers could be caught unawares if they are making unauthorised copies of popular video games.

The first surprise for anyone who is making unauthorised copies of a game is likely to be the worst of all. It will probably come in the form of a knock on the door by solicitors acting for a company alleging their games are being pirated. Those solicitors will be armed with what in legal circles is known as an 'Anton Pillar' order.

This is a court order, granted at the High Court in private and in the absence of the party accused of piracy. It entitles those alleging piracy to go to the premises of those they are accusing, to search them and sieze various items of information relating to the alleged infringement and the infringing articles themselves.

The Anton Pillar order is a legal weapon widely used in the war against all copyright piracy and particularly in the amusement, film, record and garment industries. Now, if the predictions of lawyers in the know are correct, it is a legal weapon which may very soon be aimed at those in the home computer industry.

Classified

Do you want to sell your computer and buy a bigger and better one?

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Open Forum

Open Forum is for you to publish your programs and ideas.
It is important that your programs are bug free before you send them in. We cannot test all of them.
Contributions should be sent to: Popular Computing Weekly, *Hobhouse Court, 19 Whitcomb Street, London WC2H 7HF.*

How to contribute

Each week the editor goes through all the programs that you send to Open Forum in order to find the Program of the Week.
The author of that program will qualify for DOUBLE the usual fee we pay for published programs.
(The usual fee is £10.)

Presentation hints

Programs which are most likely to be considered for the Program of the Week will be computer printed and accompanied by a cassette.
The program will be well documented, the documentation being typed with a double spacing between each line.
The documentation should start with a general description of the program and then give some detail of how the program has been constructed and of its special features.
Listings taken from a ZX Printer should be cut into convenient lengths and carefully stuck down on to white paper, avoiding any creasing.
Please enclose a stamped, self-addressed envelope.

BBC Scroll

on BBC Micro

If you own of have seen a BBC Micro listing a program, you will know how incredibly fast it is compared with other computers, even in the high-res modes where it has to scroll 20K of memory. The main reason for this is that the computer changes the address of each line of screen memory and not the actual contents.

However, since the BBC Micro is such a versatile machine, you can perform software scrolls as well. This is required when you define text windows, however, if you define the text window as being the whole screen, eg in mode 4 or 1: VDU28,0,31,39,0

When the screen is scrolled no memory addresses are changed. However, the process is much slower than normal. Without changing memory addresses we can use the Rom software to scroll up and down.

You may wish to scroll the screen

to next page

BBC Scroll
by G. Jones

```
 5 REM**LEFT+RIGHT SCROLL - G.L.J JUNE 82**
 10 MODE0
 20 FOR O=0TO3STEP3
 30 P%=&A00
 40OPT O
 50.LSCROLL
 60 LDA #0:STA &80:LDA #&30:STA &81:JSR FLINE \CLEAR FIRST COLUMN
 70 LDA #0:STA &80:LDA #&30:STA &81:STA &83:LDA #8:STA &82
 80.L1 LDY #0
 90.L2 LDA (&82),Y:STA (&80),Y:INY:BNE L2
100 CLC:LDA #1:ADC &81:STA &81:STA &83:CMP #&80:BNE L1
105 \CLEAR BOTTOM RIGHT 8 BYTES
110 LDX #8:LDA #0
120.L7 STA &7FF7,X:DEX:BNE L7
130 RTS
135
140.RSCROLL
150 LDA#&78:STA &80:LDA #&32:STA &81:JSR FLINE \CLEAR LAST COLUMN
160 LDA #0:STA &80:LDA #&80:STA &81:STA &83:LDA #8:STA &82
170.L5 LDY #255
180.L6 LDA (&80),Y:STA (&82),Y:DEY CPY #255:BNE L6
190 SEC:LDA &81:SBC #1:STA &81:STA &83:CMP #&2F:BNE L5
195 \CLEAR TOP LEFT 8 BITS
200 LDX #7:LDA #0.L8 STA &3000,X:DEX BPL L8:RTS
203
205 \CLEAR SPECIFIED COLUMN TO ENSURE NO 'WRAP ROUND'
210.FLINE
220.L3 LDY #7
230.L4 LDA #0:STA (&80),Y:DEY:BPL L4
240 CLC:LDA #&80:ADC &80:STA &80:LDA #2:ADC &81:STA &81:CMP #&80:BCC L3
250 RTS
260]
270 NEXT
275 REM**DEMONSTRATION OF SCROLLS**
280 S=GET:MODE0
290 FOR L=1TO100:DRAWRND(1280),RND(1024):NEXT
295 REM**SET TEXT WINDOW TO MAXIMUM**
300 VDU28,0,31,79,0
310 FOR L=1TO10:VDU30:VDU11:NEXT:    REM**SCROLL DOWN**
320 FOR L=1TO20:PRINTTAB(0,31):NEXT: REM**SCROLL UP  **
330 FOR L=1TO10:VDU30:VDU11:NEXT
340 FOR L=1TO10:CALL LSCROLL:NEXT
350 FOR L=1TO20:CALL RSCROLL:NEXT
360 FOR L=1TO10:CALL LSCROLL:NEXT
370 VDU26
```

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See the listing for scrolling up and down. VDU26 resets the normal scroll. If you want to learn about programming in assembler I suggest one of the things you should do is buy/borrow/steal an Atom manual, unless, that is, you want to wait for the proper BBC manual.

Reflexes

on Vic-20

This program is for the Vic-20, 3.5K, and it is called Reflexes. At the top of the screen is a cross, at the bottom is an x. You must get the cross to the x. The background is full of balls and if the cross hits the balls the screen will burst into colour with an explosion.

If you hit the x the computer will play some music. This means the cross made it without hitting a ball.

Lines 0-9 print the title page and give a red screen.

Lines 11-12 put a coloured setting on the top and bottom of the screen, 81-82 and 561-562, are also the same.

Line 13 tells the computer to gosub 2000, 2000-2380 is the music and it is used more than once in the program.

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Lines 30-40 are the layout and the quantity of the balls.

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PROGRAM OF THE WEEK

Reflexes
by Ca Saphier

```
0 PRINT"■":POKE36879,42
1 PRINT"■■■■■■■■"
2 PRINT"■■■■■■■■■■■■■■■■■■■■"
4 PRINT"■■■■    REFLEXES■    *"
5 PRINT"■■■■                 *"
6 PRIINT"■■■■      BY        *"
7 PRINT"■■■■                 *"
8 PRINT"■■■■  CA SAPHIER     *"
9 PRINT"■■■■                 *"
10 PRINT"■■■■■■■■■■■■■■■■■■■■"
11 FORA=0TO21:POKE7680+A,160:POKE38400+A,(AAND7):POKE8164+A,160
12 POKE38884+A,(AAND7):NEXT
13 GOSUB2000
14 FORA=37TO20:POKE36865,A:NEXTA:PRINT"■"
15 FORA=37TO200:POKE36865,A:NEXTA:PRINT"■"
16 FORA=0TO37:POKE36865,A:NEXTA
27 CLR
28 PRINT"■"
29 V=0:M=0
30 E=INT(22*RND(1)+7702)
40 H=INT(22*RND(1)+8164):PRINT"■■■■■":POKE36879,42
50 PRINT"**********************"
60 PRINT"* 2-DOWN    4-UP     *"
70 PRINT"* 6-LEFT    8-RIGHT  *"
75 PRINT"* F1-END    F7-RESET *"
80 PRINT"**********************"
81 FORA=0TO21:POKE7680+A,160:POKE38400+A,(AAND7):POKE8164+A,160
82 POKE38884+A,(AAND7):NEXT
90 GOSUB4000:GOSUB4000
93 PRINT"■"
100 POKE36879,12
110 FORA=1TO250
120 B=INT(4222*RND(1)+7724)
130 POKEB,81
140 NEXTA
150 POKEH,91:GETA$
160 POKEE,86
165 POKE36878,15
167 IFA$="■"THEN3200
168 IFA$="■"THEN27
169 IFA$="2"THENPOKE36876,200:POKE36876,0
170 IFA$="2"THENG=22:GOTO250
179 IFA$="4"THENPOKE36876,210:POKE36876,0
180 IFA$="4"THENG=-22:GOTO250
189 IFA$="6"THENPOKE36876,220:POKE36876,0
190 IFA$="6"THENG=-1:GOTO250
199 IFA$="8"THENPOKE36876,230:POKE36876,0
200 IFA$="8"THENG=1:GOTO250
250 M=M+1
260 POKEE,32:E=E+G
270 IFPEEK(E)=81THENGOSUB3000:GOTO550
280 POKEE,90
290 IFE=HTHENPOKE36879,11:GOSUB2000:GOTO600
300 GOTO150
550 POKE36879,8:PRINT"■■■■■■■■■■■■■■■■YOU HIT A BALL"
560 PRINT"■■■■ANOTHER GAME (Y/N)"
561 FORA=0TO21:POKE7680+A,160:POKE38400+A,(AAND7):POKE8164+A,160
562 POKE38884+A,(AAND7):NEXT
570 GETG$:IFG$=""THEN570
571 IFG$="Y"THEN590
572 IFG$="N"THEN3200
```

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6 PRIINT"■■■■      BY         *"
7 PRINT"■■■■                  *"
8 PRINT"■■■■  CA SAPHIER      *"
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190 IFA$="6"THENG=-1:GOTO250
199 IFA$="8"THENPOKE36876,230:POKE36876,0
200 IFA$="8"THENG=1:GOTO250
250 M=M+1
260 POKEE,32:E=E+G
270 IFPEEK(E)=81THENGOSUB3000:GOTO550
280 POKEE,90
290 IFE=HTHENPOKE36879,11:GOSUB2000:GOTO600
300 GOTO150
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560 PRINT"■■■■ANOTHER GAME (Y/N)"
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571 IFG$="Y"THEN590
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```

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function. Good use is also made of three of the sound generators.

It may take a little time to enter but it is worth all the effort. If anybody is interested the high score held by yours truly is 17,810. The F1 key will move you in a lane, and the F3 key will move you out of a lane (or two). This game should provide you with some food for thought.

```
5000 POKE36878,15
5010 FORL=130TO254
5020 POKE36876,L
5030 FORM=1TO40
5040 NEXTM
5050 NEXTL
5060 POKE36876,0
5070 POKE36878,0
5080 RETURN
```

Muncher
by Andrew Berti

```
7 POKE37154,127
8 IFPEEK(37137)<>94ANDPEEK(37137)<>30THEN8
800 IFPEEK(37137)=122ORPEEK(37137)=58THENL=L+G
805 IFPEEK(37137)=110ORPEEK(37137)=46THENL=L-H
810 IFPEEK(37137)=118ORPEEK(37137)=54THENL=L-G
815 IFPEEK(37152)=119THENL=L+H

0 PRINT"■":FORI=7624TO7678:READA:POKEI,A:NEXT
1 DATA0,112,64,46,26,106,10,14:V1=36878:S2=V1-3:S3=V1-2:S4=V1-1
2 DATA64,64,120,104,47,61,5,7,0,28,62,125,125,58,28,0,56,124,214,214,254,254,218
,146
3 DATA0,0,28,62,58,54,28,0,24,60,90,126,36,90,66,231,16,8,110,253,253,122,126
6 POKE36869,255:PRINT"■■■PRESS ANY KEY":S=3
8 IFPEEK(197)=64THEN8
10 PRINT"■":FORI=8120TO8143:POKEI,160:POKEI+44,160:NEXT:N=1
20 G=-1:H=0:LL=1:A=15:B=1:L=INT(RND(1)*4)+1:O=160:P=230:CH=0:M=1
90 XX=-1:YY=0:Y=20:X=10:J=X:K=Y:C=A:D=B:POKE36879,152:POKE36828,6
100 PRINT"■■┌──────────────┐"
105 PRINT"■│              │"
110 PRINT"■│  ┌────┐──┐    │"
115 PRINT"■│  │    │  │    │"
120 PRINT"■│  │  ┌─┐│  │    │"
125 PRINT"■│  │  │ ││  │    │"
130 PRINT"■│  │  │ │└─┘    │"
135 PRINT"■│  │  │ │       │"
140 PRINT"■│  │  │ │  ┌────┐"
145 PRINT"■│  ┴  ┴ ┴  │    │"
150 PRINT"■│▒▒▒▒▒▒▒▒▒▒│    │"
155 PRINT"■│▒▒▒▒▒▒▒▒▒▒│    │"
160 PRINT"■│  ┬  ┬  ┬  │    │"
165 PRINT"■│  │  │  │  └────┘"
170 PRINT"■│  │  │  │       │"
175 PRINT"■│  │  └─┐│  ┌────┐"
180 PRINT"■│  │    │  │    │"
185 PRINT"■│  └────┘│  │    │"
190 PRINT"■│        │  │    │"
191 POKE8120,221:POKE8141,221:POKE38840,6:POKE38861,6:POKE8130,230:POKE8131,230
195 PRINT"■│  └────┘│  │    │"
196 U=8142:POKEU,237:POKEU+30720,6:POKE38850,6:POKE38851,6
197 FORI=U+1TOU+20:POKEI,192:POKEI+30720,6:NEXTI
200 POKEU+21,253:POKEU+30741,6:POKEV1,7:POKE7679,60
210 IFS>1THENPOKE7953,60:IFS>2THENPOKE7954,60:IFS>3THENPOKE7955,60:IFS>4THENPOKE
7956,60
220 IFVV=1THENFORI=1TO6:POKES2,200:FORF=1TO20:NEXT:POKES2,0:FORF=1TO20:NEXTF,I
230 IFVV=1THENVV=0
250 POKES2,0:Q=7680+A+22*B:HL=7680+C+22*D:IFPEEK(Q)=221THEN500
```

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```
260 OP=SC:IFCH<>0THENPOKECH,160:CH=0
270 IFPEEK(Q)=221ORPEEK(Q)=192THEN500
295 IFO=61THENSC=SC+10:O=160:POKES3,160
296 IFO=59THENSC=SC+50:O=57:CH=HL:POKES3,230
297 IFO=63THENSC=SC+100:O=58:CH=HL:POKES3,240
300 POKEHL,O:POKEHL+30720,6
301 PRINT"[RVS]"SC;:POKE7908,221:SC=SC+1:IFOP<1500ANDSC>1499THE
NVV=1
302 IFOP<10000ANDSC>9999THENSC=SC-10000:PRINT"[RVS]   ":UU=1
303 IFOP<5000ANDSC>4999THENVV=1
304 POKES3,0:O=PEEK(Q):POKEQ+30720,2:POKEQ,60
310 D=B:C=A:A=A+G:B=B+H:IFZX=1THENZX=2:GOTO800
375 IFZX=2THENZX=0:GOTO800
380 IFPEEK(7680+A+22*B)=230THENZX=1
400 ONNGOTO600,650,700,750
410 IFQ=RTHEN1200
420 R=7680+X+22*Y
425 IFRND(1)>.993ANDP=160THENP=63:POKES4,240
427 IFRND(1)>.98ANDP=160THENP=59:POKES4,200
428 IFRND(1)<.2ANDP=160THENP=61:POKES4,180
429 IFP=230THENCO=6
430 IFP=59THENCO=4
431 IFP=61THENCO=5
432 IFPEEK(R)=192ORPEEK(R)=221THEN1050
433 IFP=63THENCO=2
434 POKE7680+J+22*K,P:POKE38400+J+22*K,CO
438 P=PEEK(R):POKES4,0:POKER+30720,0:POKER,62:J=X:K=Y:X=X+XX:Y=Y+YY
461 IFJ=CANDK=DTHEN1200
465 IFPEEK(7680+X+22*Y)=230THENGOSUB1000
467 POKES2,135
470 ONMGOSUB850,900,930,960
480 IFVV=1ANDUU=0THENS=S+1:GOTO210
490 GOTO250
500 N=N+1:IFN=5THENN=1
510 A=C:B=D
520 IFN=1THENG=-1:H=0
530 IFN=2THENG=0:H=1
540 IFN=3THENG=1:H=0
550 IFN=4THENG=0:H=-1
560 GOTO310
600 B=L*2-1:GOTO410
650 A=L*2-1:GOTO410
700 B=22-L*2:GOTO410
750 A=22-L*2:GOTO410
800 IFPEEK(197)=47THENL=L-1
810 IFPEEK(197)=39THENL=L+1
820 IFL<1THENL=1
830 IFL>4THENL=4
840 GOTO400
850 Y=22-LL*2:RETURN
900 X=LL*2-1:RETURN
930 Y=LL*2-1:RETURN
960 X=22-LL*2:RETURN
1000 IFRND(1)<.1THENRETURN
1005 IFLL>LTHENLL=LL-1
1010 IFLL<LTHENLL=LL+1
1015 IFLL>4THENLL=4
1017 IFLL<1THENLL=1
1020 RETURN
1050 M=M+1:IFM=5THENM=1
1060 X=J:Y=K
1070 IFM=1THENXX=-1:YY=0
1075 IFM=2THENXX=0:YY=-1
1080 IFM=3THENXX=1:YY=0
1085 IFM=4THENXX=0:YY=1
1090 GOTO465
1200 POKES2,0:POKES4,220:POKE7680+C+22*D,170
1240 PRINT"[RVS]BAD ILUCK":L=16
1245 L=L-1:POKEV1,L:IFL=0THEN1290
1260 FORI=1TO60:NEXTI
1285 GOTO1245
1290 S=S-1:IFS=0THEN1400
1300 FORI=1TO100:NEXTI:GOTO10
1400 PRINT"[RVS]GAME OVER"
1440 RUN6
```

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Telephone Call

on ZX81

The need for this telephone call calculation program arose when British Telecom presented me with a telephone bill in excess of £100. Having no other way to check, as the meters are in the exchange, I wrote this program to keep a check on all of my calls.

Any alterations Telecom makes in the unit time can be adjusted in lines 30 to 110; the values are in decimals of a minute. If the cost per unit alters that can be changed in line 795. The rate of VAT is in line 820. The timing is calculated in line 720 and is accurate to a couple of seconds per hour.

The S key is used to stop the timing at which point the cost of the call will be displayed.

The total bill to date will be displayed if the program has been resaved using the commands Break followed by Goto 1000.

Telephone Call
by Ian Carson

```
   0 PRINT AT 0,8;"TELEPHONE
R"
   1 REM "TELEPHONE"
   2 FOR I=0 TO 50
   3 NEXT I
   4 CLS
  10 LET TOT=0
  20 DIM R(9,3)
  30 LET R(1,1)=8
  40 LET R(1,2)=2.4
  50 LET R(1,3)=0.5
  60 LET R(2,1)=2
  70 LET R(2,2)=0.75
  80 LET R(2,3)=0.26667
  90 LET R(3,1)=1.5
 100 LET R(3,2)=0.5
 110 LET R(3,3)=0.2
 120 PRINT AT 3,0;"      TELEPHONE
CALL COSTS"
 130 PRINT AT 3,0;"   DISTANCE O
F CALL:-"
 140 PRINT AT 5,14;"LOCAL - ENTE
R L"
 150 PRINT AT 7,5;"UP TO 35 MILE
S - ENTER A"
 160 PRINT AT 9,6;"OVER 35 MILES
- ENTER B"
 170 PRINT AT 11,0;"R REFER TO C
ODE BOOK IF UNSURE R"
 180 INPUT R$
 190 IF R$="L" THEN LET O=1
 200 IF R$="A" THEN LET O=2
 210 IF R$="B" THEN LET O=3
 220 IF R$<>"L" AND R$<>"A" AND
R$<>"B" THEN GOTO 180
 230 IF O=1 THEN PRINT AT 5,30;"
L"
 240 IF O=2 THEN PRINT AT 7,30;"
A"
 250 IF O=3 THEN PRINT AT 9,30;"
B"
 260 PRINT AT 14,4;"DAY      R R
R R R R R"
 270 PRINT
 280 PRINT "8 AM - 9 AM          S
 290 PRINT "9 AM - 1 PM*********P*
*****C"
 300 PRINT "1 PM - 6 PM          S
 310 PRINT "6 PM - 8 AM          S
 320 PRINT
 325 LET H=8
 330 PRINT " WHICH RATE C, S OR P-"
 340 INPUT Z$
 350 IF Z$="C" THEN LET H=1
 360 IF Z$="S" THEN LET H=2
 370 IF Z$="P" THEN LET H=3
 380 IF Z$<>"C" AND Z$<>"S" AND
Z$<>"P" THEN GOTO 340
 390 IF M=1 THEN PRINT AT 21,23;"CHEAP"
 400 IF M=2 THEN PRINT AT 21,23;
"STANDARD"
 410 IF M=3 THEN PRINT AT 21,23;
"PERK"
 420 FOR O=8 TO 25
 430 NEXT O
 440 CLS
 450 PRINT AT 1,4;"CALL DATA      R"
 460 IF O=1 THEN PRINT AT 3,4;"R
OTHERS - LOCAL"
 470 IF O=2 THEN PRINT AT 3,4;"R
OTHERS - LESS THAN 35 M"
 480 IF O=3 THEN PRINT AT 3,4;"R
OTHERS - OVER 35 M"
 490 IF M=1 THEN PRINT AT 5,4;"R
TYPE - CHEAP"
 500 IF M=2 THEN PRINT AT 5,4;"R
TYPE - STANDARD"
 510 IF M=3 THEN PRINT AT 5,4;"R
TYPE - PERK"
 520 PRINT AT 8,0;"  TIME ALLOWE
D PER UNIT ( SP )"
 530 LET E=R(H,O)
 540 LET P=E-INT E
 550 LET U=INT (P*60+0.5)
 560 PRINT AT 10,9;INT E;" MINS
";U;" SECS"
 570 PRINT AT 12,0;"  PRESS ANY
KEY TO START TIMING"
 580 PRINT AT 14,0;"  AND THE ""
S"" KEY TO STOP TIMING"
 590 IF INKEY$<>"" THEN GOTO 600
 595 GOTO 590
 600 FOR I=0 TO 1000000
 610 PRINT AT 18,12;" TIMING "
 620 PRINT AT 18,12;" TIMING "
 630 PRINT AT 18,12;" TIMING "
 640 PRINT AT 18,12;"        "
 650 PRINT AT 18,12;"        "
 660 PRINT AT 18,12;"        "
 670 IF INKEY$="S" THEN GOTO 700
 680 NEXT I
 700 CLS
 709 PRINT AT 0,0;"
R
 710 PRINT AT 1,0;"          C
OST OF CALL  "
 711 PRINT AT 2,0;"
R"
 720 LET C=I/265.5
 730 LET D=C-(INT C)
 740 LET D=INT (D*60)
 760 PRINT AT 5,0;"  DURATION
 - ";INT C;" MINS ";D;" SECS"
 770 PRINT AT 6,0;"TIME PER UNIT
 - ";INT E;" MINS ";U;" SECS"
 780 LET W=INT (1+(C/E))
 790 PRINT AT 11,0;"UNITS CONSUM
ED- ";W
 795 LET U=4.3
 800 LET P=INT ((W*U)+.5)
 810 PRINT AT 14,0;"COST      (EX
C. VAT) - ";P;" P"
 820 LET L=INT ((W*(U+1.15))+.5)
 830 PRINT AT 17,0;"TOTAL     (IN
C. VAT) - ";L;" P"
 840 LET L=L/100
 850 LET TOT=TOT+L
 860 PRINT AT 21,0;"TOTAL BILL
TO DATE - ";TOT;" P"
 900 IF INKEY$<>"" THEN GOTO 910
 905 GOTO 900
 910 CLS
 920 GOTO 20
 950 STOP
1000 SAVE "TELEPHONR"
1020 GOTO 20
```

```
TELEPHONE CALL CALCULATOR

DISTANCE OF CALL:-
        LOCAL - ENTER L
UP TO 35 MILES - ENTER A
OVER 35 MILES - ENTER B
R REFER TO CODE BOOK IF UNSURE R

DAY      R R R R R R R

8 AM - 9 AM                S
9 AM - 1 PM*****************C
1 PM - 6 PM                S
6 PM - 8 AM                S

WHICH RATE C, S OR P- PERK
```

```
CALL DATA
OTHERS - OVER 35 M
TYPE - PERK

TIME ALLOWED PER UNIT ( SP )
      0 MINS 12 SECS
PRESS ANY KEY TO START TIMING
AND THE "S" KEY TO STOP TIMING

R R R R R
```

```
COST OF CALL

DURATION  - 2 MINS 26 SECS

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Programming

Putting more byte into the mini-micro

***Elizabeth Wald** explains space saving techniques on Sharp's PC1211.*

The Sharp PC1211 is a remarkable computer for its size, but it does have one major disadvantage — a mere 1424 bytes of memory. However, with careful programming this can be overcome.

It is important to use variables efficiently to store data for programs as this will reduce the number of variables required, and often the length of the program. Each variable can store up to ten digits plus an exponent and signs. Therefore, if five two-digit numbers need to be stored they can be held in one variable as a decimal fraction. The routine needed to store this information is:

```
A(x)=A(x)+E−m↑y*a          (nb E=exponent symbol)
```

Where A(x) is the variable for storage, m is the number of digits (in this case two), y is the position within the variable, and a is the number to be stored (m*y must not exceed 10). For example:

```
10:A=12:Y=2:A(30)=A(30)+E−2↑Y*A
```

Conversely, the following routine will extract the data and produce the result in A:

```
A=INT (Em↑y*A(x)):A=A−Em*INT E−mA
```

eg:

```
10:A=INT (E2↑Y*A(30)):A=A−E2*INT E−2A
```

Storing the data as a decimal fraction often makes handling easier, although there are exceptions. Also, it is sometimes advantageous to store a commonly used number as the integer part of the variable — especially if it is handled differently to the data stored in the fractional part. It will therefore be easier to access by using the *Int* function.

One other way of saving time is to use one of the variables W-Z as the control variable in a *For . . . Next* loop. This will reduce the time taken for the loop to be performed by 0.05 seconds per iteration. The reason for this is that these four variables are stored in the same memory chip as the *For . . . Next* stack and are therefore slightly quicker to access.

On a similar note, Z=M is about 0.02 seconds faster than A=M, and M=A is about 0.02 seconds faster than M=Z. It therefore pays to have the higher variable on the left of an assignment, and the lower variable on the right. This does not apply to variables above Z, which seem to take longer.

Sharp's PC1211 . . . the secret is to use variables efficiently.

As space is so precious on the PC1211, it is essential to ensure that each line of program does not require more steps than are necessary.

The first way in which this can be achieved is by using the key words efficiently. Key words are stored as one step each, irrespective of their length. It therefore may be advantageous to use them as prompts for *Input* statements or in *Print* statements.

We may decide on the prompt

```
10:INPUT "ENTER A LETTER",X$
```

This will occupy 23 steps (two for the line number, one for the *Input* statement, 19 for the other characters, and one for the *Enter* key). If we replace the word *Enter* by the key word *Input* we reduce the number of steps by five. To do this key in:

```
10 INPUT INPUT    'ENTER'
```

Then, insert an inverted comma before the second *Input* and complete the line. As an added bonus, the space is automatically inserted after *Input*. One word of warning — do not try to enter too many words as unexpected results may occur:

```
10 INPUT INPUT A LETTER',X$
```

produces

```
10:INPUT INPUT ALET TER',X$
```

Some key words can be omitted. *Then* is totally superfluous and the Rem command does not work very well as the comment must be enclosed by inverted commas if spaces are required within. *Let* can also be omitted in all circumstances bar one. The only occasion when it is required is after a numerical test in an *If* statement:

```
10:IF A=5LET C=12
```

But note:

```
10:IF A$="YES"B=2
```

is a valid statement, despite the description given in the manual for the *If* statement.

Other ways of saving space may seem a little unnecessary, but they may make all the difference on a long program. Lines should be as long as possible, as line numbers are stored in two steps, plus one for the *Enter* key at the end of the line, whereas the separating colon will occupy only one step.

Logic statements are particularly useful in saving space. These take the value 1 if true, and 0 if false, and can be used to reduce the need for complicated *If* statements which have the disadvantage that the next statement will need to be on the following line. They can also save time when assigning values to variables.

An example would be when directions have to be entered during a game. The numerical keyboard can be used to represent the directions by using 5 as the base position, and the other keys to represent moves in relation to it. Thus 8 will be up or north, 6 right or east, and so on around the keyboard.

If the variable D is used to enter the direction, the following can be used to assign the changes in the co-ordinates to variables X and Y:

```
X=(D=6)−(D=4):Y=(D=8)−(D=1)
```

Logic statements can also be used to perform the same functions as *On . . . Goto* and *On . . . Gosub* in standard Basic.

```
Standard ON X GOTO 100,150,230
PC1211 GOTO 150−50*(X=1)+80*(X=3)
```

Space can also be saved by utilising the fact that pressing *Enter* alone in an *Input* statement, will automatically send the computer to the next line. This saves the need for an *If* statement, for example by entering Y for yes and *Enter* for no. Defined keys can also be used in a similar way to transfer control to other parts of the program.

Spectrum

Learn to eat as much as you can

***Sam Goodwin** presents some machine code tips and a new game called snake.*

Although lower case lettering often improves programs, it can also lead to trouble. Some programs will act on the upper case letter A being pressed, but they will not recognise lower case a as being the same. To avoid this problem on the ZX Spectrum you can either test both conditions:

```
100 LET I$=INKEY$
110 IF I$="A" OR "a" THEN . . .
```

or switch on the CAPS LOCK in the program.

```
100 POKE 23658,8 : REM CAPS LOCK ON
110 IF INKEY$="A" THEN . . .
POKE 23658,0 will switch CAPS LOCK OFF.
```

The one graphics command I miss is a *Plot* 23,45 *To* 67,89. To do this on the Spectrum you always need to know where the end point is in relation to the starting point. This is because the command used for drawing lines (*Draw*) will act from the last recorded point (The above instruction would be entered as PLOT 23,45 : DRAW 44,44.)

The following program sketches a fine system of spirals by subtracting the previous plot position from the new one so lines can be joined as absolute coordinates.

```
10 LET X=23677: LET Y=23678
20 PLOT 128,88
30 FOR T=0 TO 377
40 LET R= SIN (T• 3/4)
50 DRAW SIN T•R•80+128-PEEK X,
COS T•R•80+ 88-PEEK Y
60 NEXT T
```

Machine Code

All the registers can be used except for the HL pair. If you are going to change their contents during the program it is wise to restore their original contents before returning to basic.

For machine code that requires critical timing, such as printer output and sound effects, it may be necessary to disable the clock and keyboard scans. This is done with the DI instruction (Disable interrupt, code 243). The keyboard scan must be Enabled, code 251, before returning, otherwise the system will hang when a keyboard input is required.

This feature could be used to protect programs from being copied, as disabling the break key would make it impossible to stop the program without switching the computer off.

Instructions can be stored in the user definable graphics memory area. This would allow the program to be retained, even after the *New* command.

The following machine code program does a smooth horizontal scroll from right to left along the middle of the screen:

```
1d BC,window size
1d HL,lowest point
→rl (HL)
  dec HL
  djnz →
  dec C
  jr NZ →
  ret
```

The machine code could be entered in the following way:

```
10 FOR A=USR "S" TO USR "U"
20 INPUT B
30 POKE A,B
40 NEXT A
```

RUN

```
1 8 0 33 255 79
203 22 43 16 251
13 32 248 201 0 0
```

(The information has been stored in an area that will remain unaffected by the instruction NEW.)

NEW

```
10 FOR A=0 TO 26 STEP 1
20 PLOT 255,SIN A•30+80+USR USR "S"
30 NEXT A
40 CLS : LIST : LIST
50 LET A=USR USR "S"
60 GOTO 50
```

The above program should produce a gently moving sine wave that glides across the screen, and then display the program rolling the middle section smoothly from right to left.

The one bug I have found in the Spectrum is hardly worth worrying about. In fact, it could prove to be beneficial.

It appears that when a *Control* H (back space) is printed at the beginning of a line, the previous line loses one of its bytes. The idea of being able to edit a program while it is being Run offers tremendous potential, but somehow I do not think it was an intended feature.

Finally, I have devised a game called Snake. You are a slowly growing snake, kept in a confined space. The object of the game is to eat as much of the food as possible, while avoiding the obstacles.

When entering this program, it is important to type in line 50 with exactly 33 spaces in the *Print* statement. The character printed in lines 186 and 230 is a user definable A.

```
  5 BRIGHT 0: OVER 0
 10 FOR A=USR "A" TO USR "A"+6
 20 POKE A,62: NEXT A
 40 LET I=0: LET P=7: INK I: PA
PER P: CLS : GO SUB 500
 50 LET B=6: BORDER B: PAPER B:
 PRINT "                                 "
 ;
 60 FOR N=1 TO 20: PRINT AT N,3
1;"  ": NEXT N: PRINT AT 21,31;" ": PAPER P
 70 LET FOODC=2: LET ROCK=3
 80 LET SNAKE=4: LET FOOD=8+8+F
OODC: POKE 23658,0: REM CAPSLOCK
 100 LET LAND=8+6+I: LET MX=1: L
ET MY=0
 110 LET S=1: LET X=2: LET Y=8
 120 DIM X(200): DIM Y(200)
 130 FOR N=1 TO S
 140 LET I$=INKEY$
 150 IF I$="N" THEN LET MX=-1: L
ET MY=0
 160 IF I$="M" THEN LET MX=+1: L
ET MY=0
 170 IF I$="O" THEN LET MY=-1: L
ET MX=0
 180 IF I$="A" THEN LET MY=1: LE
T MX=0
 185 LET X=X+MX: LET Y=Y+MY: LET
 A=ATTR (Y,X)
 185 IF Y<22 THEN PRINT AT Y,X;"■"
 187 IF A=FOOD THEN LET S=S+5: GO TO 200
 188 BEEP .01,S/4
 190 IF A<>LAND THEN INPUT "  Yo
u have ""CRASHED"";A$: RUN
 200 PRINT AT 0,0; PAPER B;" SCO
RE = ";S*10
 210 PRINT AT Y(N),X(N); INK I;
PAPER B;" "
 220 LET X(N)=X: LET Y(N)=Y
 230 PRINT AT Y,X; INK SNAKE;"■"
 240 NEXT N
 245 PRINT AT RND•10+5,RND•20+5;
INK FOODC;"■"
 246 PRINT AT RND•21+.5,RND•25+.
5; INK ROCK;"■"
 250 LET S=S+RND•5
 260 GO TO 130
 500 PRINT AT 1,9;"SNAKE _____ ""'","By
Sam Goodwin"
 510 PRINT ""'" You are a snake a
nd must try to eat the food but a
void hitting anything else."
 520 PRINT "  ■ - Rocks , ■ -
Food"
 530 PRINT ""'"  To move Press  O
 to go Up""'"  N-Left,M-Right &
A to go down"
 600 INPUT a$: CLS : RETURN
```

Sound & vision

It's all a question of values, ain't it?

This is a simple yet effective program for the BBC micro model B, to show the graphs of various equations. The equation is typed in the form Y=F(X). The computer then asks for what values of X you wish to equate Y with.

If you press *Return* without entering any values, the program will default to plotting over the whole range of −640 to +640. Note that the origin is in the centre of the screen.

The computer will draw the axis in white, marking them in steps of 100. It will then draw the original equation in blue, then scale it up or down as appropriate and draw it again in yellow.

However, funny things can happen if very large Y values are encountered, so try and keep the values sensible.

Program notes

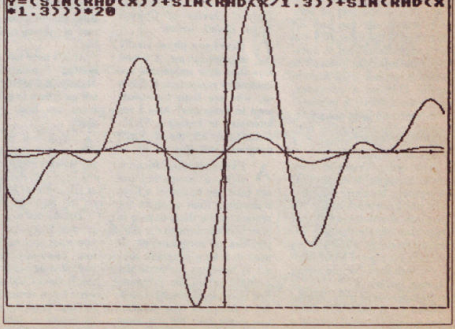
Line 70 shifts the graphics origin from 0,0 to 640,512,IE in the middle of the screen, so that negative values of Y are plotted directly.

Variable D is the scaling factor; after the first plot, M contains the largest value of Y, and D=512/M sets D to the required scaling value. Just in case you are not sure what the 'EVAL' in line 170 does, imagine that A$="2*X" and X=2 — the instruction Y=EVAL(A$) assigns the number 4 to Y.

Gwynfor Jones

Graph plot
by Gwynfor Jones

```
  5 REM**GRAPH PLOT - G.L.J JUNE82**
 10 MODE7
 20 D=1:M=0:C=1
 30 INPUT"Y="A$'"FOR VALUES OF X FROM "S'"TO "F
 40 IF S=0 AND F=0 S=-640:F=640
 50 MODE1:PRINT"Y=";A$
 60 VDU19,1,4,0,0,0
 70 VDU29,128,2,0,2
 80 REM**DRAW AXIS**
 90 MOVE-640,0:DRAW640,0:MOVE0,-512:DRAW0,512
100 FOR L=-700TO700STEP100:MOVEL,-4:DRAWL,4:NEXT
110 FOR L=-600TO600STEP100:MOVE-4,L:DRAW4,L:NEXT
120 REM**MAIN LOOP**
130 GCOL0,C
140 X=S:MOVES,EVAL(A$)*D
150 FOR X=S TO F STEP4
160 IF X=0 GOTO210
170 Y=EVAL(A$)*D
180 IF Y>65500 OR Y<-65500 GOTO210
190 IF Y>M M=Y
200 DRAWX,Y
210 NEXT
220 IF C=2 G=GET:RUN
230 D=512/M:C=2:GOTO 130
```



Contribute!

You can share your own favourite Sound or Vision programs with other readers by sending lists with explanations to us at *Popular Computing Weekly*.

WRITE TO: Sound & Vision, Popular Computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

Peek & poke

Peek your problems to our address. Ian Beardsmore will poke back an answer.

BUDDING MICRO STAR NEEDS SCREEN TEST

Tony Johar of Cambridge Road, Hounslow, Middlesex, writes:

Q I cannot decide which television or monitor to buy for my ZX Spectrum. I have been informed that it is possible to connect a colour monitor to the Spectrum using the existing port. Is this correct and does the Spectrum give out a PAL signal?

There are three types of Visual Display Unit that I am thinking of buying. The first is a Sony Trinitron television which is meant to be good for computers. The second is a Portatel Luxor 14in monitor, which is a cross between a television and a monitor, and has PAL and RGB inputs. I am told that it works better than an ordinary television because it does not rely on the internal modulator.

Or, should I go the full swing and buy a proper monitor? But, I am not sure if I really need it since the Spectrum does not give out the extremely high resolution graphics of the BBC computer. Will a proper monitor give me a significantly higher quality to justify its purchase, bearing in mind that the Luxor can be used as a television as well?

A This is the sort of area where one can end up spending a lot of money for little appreciable gain. A question you must ask yourself is whether or not it is wise to spend £175 on a computer, and then £300 on a monitor? The Spectrum gives out a PAL signal and is compatible with any PAL UHF colour, or black and white, set.

The Sony Trinitron does make a reasonable monitor for computers, but there are other sets which are much better. No one can doubt the quality of television picture that the Trinitron produces, but if you are looking for a good VDU facility as well then I would advise against buying it.

Portatel were very helpful when I got in touch with them, and though they had not had a Spectrum on a Luxor, they had had very good results on their Hitachi monitors.

The Luxor has the advantage of being compatible not only with European PAL standards but also the US NTSC specifications which make it very versatile. It can be used on most of the popular home computers and I am sure that it would enhance the Spectrum. However, £300 is a lot of money to pay for a monitor.

One alternative, if you are not sure about how much computing you are going to do in the future, is to buy a cheap secondhand colour set and find an electrician to take the various circuits that accept and amplify the broadcast signal. Replace the signal amplifier circuit, the tuner circuit, et al, with a fixed frequency oscillator circuit. This would give you in effect a monitor, at a much lower price.

However, one word of warning. This is an option that you can take only if you know a good eleetrician. It would be very easy for someone to bodge a job like this and leave you in a worse state than before. Allow at least £50-£75 for the secondhand television and £20-£40 for the work.

REMARKABLE HELP FOR POOR HUMANS

Dafydd Davies of Cynwyl Elfed, Dyfed, writes:

Q Could you please clarify a point for me. A friend says that Rem statements are ignored by computers. If this is so, why are Rem statements used in programs? Also I am interested in buying a Vic30. Could you tell me if Vic20 programs will *Run* on it?

A Essentially your friend is right, a computer does not take any notice of a Rem statement. Rem is short for remark, and is there to help us poor humans through the complexities of programming. If used in a long program, they act as headings for particular routines within the program. For example, if you have written a Breakout type program you might have the statement Rem "SET UP WALL" at the start of the section that does just that. If, when you come to *Run* the program the wall does not work properly, then the Rem will help you find the section which is at fault.

As to the question of the Vic20, and the Vic30 programs being compatible, until we actually get a machine we cannot be absolutely sure. It seems unlikely that the two will be directly compatible, because it is very improbable that the memory locations will be the same.

Also, the Vic10 has a reduced version of Basic, with no *Dim* statements. As the Vic30 is a closer relation to the Vic10 than the Vic20, it is possible that it will have this reduced Basic as well. So, any program on the Vic20 which uses a statement that is not available on the Vic30 will not *Run* without some sort of modification.

AVOID MAKING A BOOB WITH THE BEEB

Mark Middleton of Cannon Hill Road, Coventry, writes:

Q I have ordered a BBC micro model B. After a delay of five months, I expect it to be here soon. My friend has just bought a synthesizer, and we wondered whether or not we could connect them together. If so what port on the BBC should I use, and what sort of ribbon cable should I buy?

Also, I have had difficulty in getting *Popular Computing Weekly* in Coventry. Can you tell me where to get it, and are there any back issues available?

A You will by now have read in *Popular Computing Weekly* about the delays in the model B, though the Beeb at last seem to be catching up on the backlog.

You do not say what sort of synthesizer your friend has, nor what sort of I/O ports it has. The only synthesizer I have had any experience of is the Roland C100 series. From what I can remember, all the internal patching on that was by means of Jack plugs and, apart from the speakers, external access was the same. This would mean that there was no directly compatible port on the BBC micro.

To my knowledge it would not be possible to directly link the two. The most likely port to use would be the RS 423, but I cannot see it being used without some sort of buffer hardware.

I must ask why you want to connect your BBC micro to a synthesizer? The synthesizer should have all the features you need. By comparison a computer is a very poor music maker and I cannot see how it can add to the synthesized sounds. Cassettes can be ued to store the music in a normal audio fasion, while patch notes should be available to store the various configurations used to create the sounds.

There is a trap which, quite understandably, many people fall into. A computer is not a universal panacea that will do absolutely anything. Nor is there any real point in trying to do things with your computer just because you happen to have the bits there.

As for your problems in getting a copy of *Popular Computing Weekly*, I have passed your letter on to our distributors. In the last few weeks, now that we have become established, circulation has been increasing which has led to some local problems. Problems we are overcoming by stepping up production.

Back issues are available, except for issue two. If you write to us with a cheque or postal order for 50p per issue, we will be happy to send them to you. Mind you, the way to guarantee a regular copy is to place a regular order, or take out a subscription. It is well worth it.

STOP agonising over that nagging problem. Write to Ian Beardsmore at Peek & poke for the answer. Letters should be as brief as possible and include full name and address. Write to Peek & poke, *Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

Competitions

Is your number high or low?

by Gordon Lee

The use of logarithmic functions to find powers and roots has been seen to bring its own problems when used with *If Then* statements (*PCW* July 15 Puzzle).

For a cube, the ** can be replaced by two separate *s (ie replace 3**3 by 3*3*3). Unfortunately, it is not always possible to avoid using logarithmic functions — for instance, in the case of cube roots. If there is no easy way around the problem, then the conditions of the *If Then* statement must be changed.

In theory, having found the cube root of our number, we can just test to see if it is a whole number (integer). In practice, we know that this value may be a bit out, and we have no easy way of knowing if it is slightly too high or too low. If it is too high then:

```
IF ABS(N-INT N)<0.000001 THEN . . .
```

will work. However, if N is slightly too low:

```
PRINT INT (27 ** (1/3))
```

gives a reading of 2.

All is not lost. Since we know that the value to be tested might be slightly under the integer, we add a small amount — eg 1E−8.

If the value being tested was within this value of the integer, it will now equal or slightly exceed that integer. This we can test as above. So the complete test necessary is:

```
IF ABS(N-INT(N+1E-8))<0.000001 THEN . . .
```

The amount added (1E−8) should be more than the possible error induced by the system and less than the limit of accuracy expected for the test.

Puzzle No. 16

Professor Otto Hex, the well known mathematician, recently moved house.

In order to help him remember his new telephone number (he was rather absent-minded) he used the ages, in years, of his four offspring.

To get the number he could either add the cube of Susan's age to the cube of Billy's age or add the cube of Lucy's age to the cube of Ronnie's age.

What was Otto's new number? (He lives in a small village so the smallest possible solution is the correct one.)

Rules

The winner of the puzzle will be the reader who, in the opinion of *Popular Computing Weekly*, has submitted the best program.

Entries should be marked clearly "PUZZLE".

The closing date for the competition is Tuesday, August 17.

Solution to Puzzle No. 12

The fourth and fifth lines of the poem tell us that this is a cryptarithm, in which numbers are substituted for letters.

As there are more than ten different letters in the names given, each name should be treated separately. Each name consists of three identical letters and three different letters — though with the identical letters placed in a different position in each case. This means that we need to find eight six-digit numbers which are perfect squares which, in each case, have three identical digits in the positions indicated by the letters found in each of the names. Also the remaining three digits must be different.

The guilty party will be the one whose name 'code' number is the largest.

In the example below, Lines 30 to 50 are set to test the name Beedle. For the other names, the string locations (N$(1−6)) in Lines 30 to 50 should be altered.

```
10 FOR N = 999 to 317 STEP - 1
20 LET N$ = STR$ (N * N)
30 IF N$ (2) < > N$ (3) OR N$ (2) < > N$ (6) THEN
   GOTO 100
40 IFN$ (2) = N$ (1) OR N$ (2) = N$ (4) OR N$ (2)
   = N$ (5) THEN GOTO 100
50 IF N$ (1) = N$ (4) OR N$ (1) = N$ (5) OR N$ (4)
   = N$ (5) THEN GOTO 100
60 PRINT N, N * N
70 STOP
100 NEXT N.
```

The largest possible squares in each case are:

Beedle = 944784 = 972²; DeVere = 190969 = 437²; Farrer = 824464 = 908²; Heeley = 900601 = 949²; Lowell = 438244 = 662²; Nanson = 151321 = 389²; O'Toole = 565504 = 752²; and Strutt = 902500 = 950².

The largest of these is 944784 so Beedle did it.

Winner of Puzzle 12

The winner is: Ian Turtle, St John's Road, Ashby, Scunthorpe, South Humberside, who receives £10.

Solution to Crossword 12

Across: 4 Robin, 7 Spartan, 8 Screen, 10 Adana, 12 Ruin, 13 Athlete, 14 Xmen, 15 Clark, 16 Unborn, 20 Captain, 21 Angel.

Down: 1 Spiderman, 2 Ironman, 3 Dan, 5 Orc, 6 Ire, 8 Super, 9 Epidermis, 11 Chain, 12 Replete, 17 Bun, 18 Roe, 19 Man.

Winner of Crossword 12

The winner is: R. Filleul, Nunthorpe Road, York, who receives £10.

spectrum

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VIC Computing Magazine	£0.95	No VAT

ATARI

The model 400 has 16K of RAM and a touch sensitive keyboard. The 800 model has a professional style typewriter keyboard and a memory which is user expandable to 48K. Add drive drives (up to 4) and a printer and you have a system of adequate power for business uses.

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Developed by the Company famous for its TV and arcade games the Atari Computers have superb colour graphics and facilities for the manipulation of visuals on the screen.

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Plug a "BASIC" cartridge in and you have a comprehensive computer.

ATARI 400

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CIT Cassettes	£0.43	£0.50
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Single sided, double density double track disks (for Nascom and Commodore 8050)	£2.30	£2.65
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	EXC VAT	INC VAT
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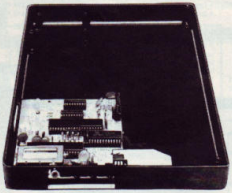

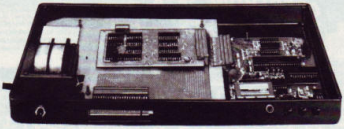

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